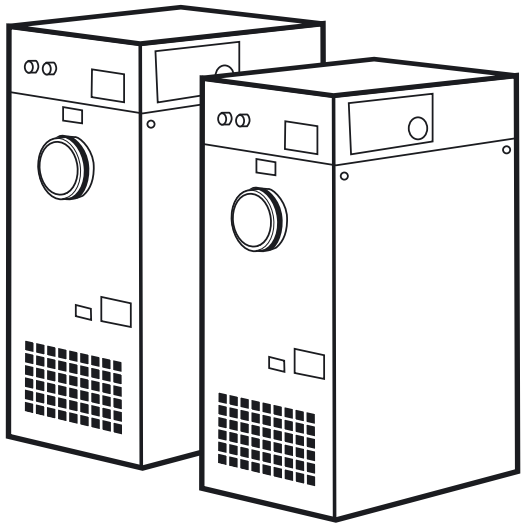
User's Manual

ML/MLT

180-350



Desiccant Dehumidifier
ML180-MLT350

Effective for units manufactured from week 46, 2002

190TGB-1034

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Munters

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Important user information

Intended use of equipment

Munters dehumidifiers are intended to be used for the dehumidification of air. All other uses of the equipment, or use which is contrary to the instructions given in this manual, can cause personal injury and/or machine damage.

Warranty and obligations

The warranty period is 12 months from the date the equipment left our factory unless otherwise advised in writing. The warranty is limited to a free exchange complete with free freight, of faulty units or components which have failed as a result of faulty quality or defects in manufacture.

Munters guarantees that the delivered unit has undergone rigid testing to ensure that the specifications stated here are fulfilled. All claims on warranty must verify that the fault has occurred within the guarantee period, plus that the unit has been used within its operating range as stated in the specification. All claims must include the unit type and manufacturing number. This data is to be found stamped on the unit identification plate, see Section ***Markings*** for location.

Note

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Safety

In this publication hazardous activities are indicated and preceded by the common hazard symbol.

⚠ ***WARNING!*** *is used in this publication to indicate a possible danger that could lead to personal injury. An instruction is normally given, followed by a short explanation plus the possible effect if the instruction is not followed.*

⚠ ***CAUTION!*** *is used in this publication to indicate a possible danger that could lead to damage to the machine or other equipment and/or cause environmental damage. An instruction is normally given, followed by a short explanation plus the possible environmental effect if the instruction is not followed.*

NOTE! *Used to accentuate supplementary information that is required for problem-free use or optimal use of the unit.*

Conformity with directives and standards

Munters dehumidifiers are designed and manufactured by an EN-ISO 9001 accredited development and manufacturing organization. The unit conforms with the specifications in the Machinery Directive 98/37/EEC, the Low Voltage Directive 73/23/EEC as amended by Directive 93/68/EEC and the EMC Directive 89/336/EEC as amended by Directives 92/31/EEC and 93/68/EEC. The standards applied are listed in the EC Declaration of Conformity.

1 Introduction

1.1 General

Munters dehumidifiers are designed to efficiently dehumidify air. Munters has a wide range of dehumidifiers that have design parameters applicable for different usages and applications. Please contact your nearest Munters office if you have any doubt or questions regarding the actual installation.

For product data information, *see chapter 6, Product Design Information*.

1.2 About this manual

This manual is written for the user of the dehumidifier and describes the installation, operation, maintenance and basic fault finding.

The information structure of the manual is built on numbered chapters and sections. Contents (page 3) gives a quick overview. The different chapters can be used separately to serve their purpose. Figures and tables are numbered in accordance with the actual chapter, e.g. figure 1-3 is picture number 3 and is found in chapter 1.

The goal of the manual is to provide the necessary information for the user to understand the unit's construction and function, and as to serve as a guide during installation, operation, maintenance and basic fault finding that generally can be carried out before contacting Munters Product Service.

1.3 Safety and Cautions

The contents of this manual include suggested best working practices and procedures. These are issued for guidance only, they do not take precedence over the individual responsibility and/or local safety regulations. During installation and operation of this equipment it is always each individual person's responsibility to consider:

- Their own and others' personal safety.
- The safety of the unit through correct us of the equipment in accordance with the descriptions and instructions given in this manual.

Every care has been taken in the design and manufacture of the ML-Series dehumidifiers to ensure that they meet the safety requirements of the directives and standards listed in the EC Declaration of Conformity.

It is recommended to be informed about the use of safety symbols in this manual by reading the opposite page *Important user information*. The relevant safety information for this manual will be found listed early in each manual chapter.

1.4 Markings

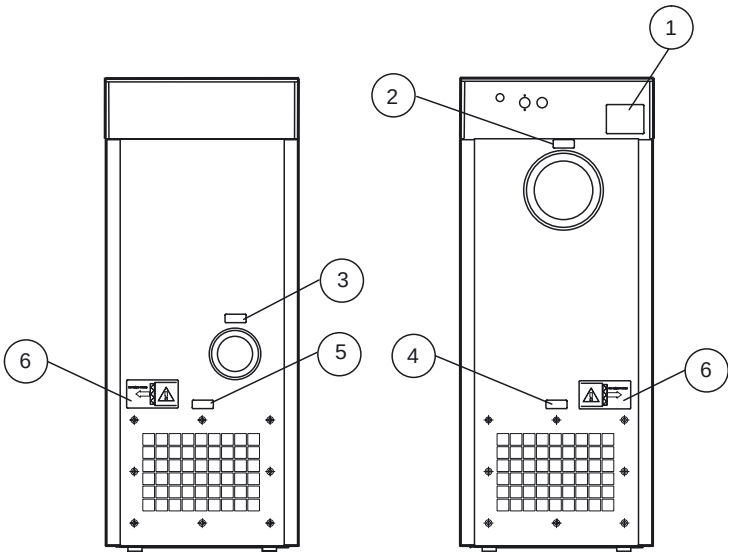
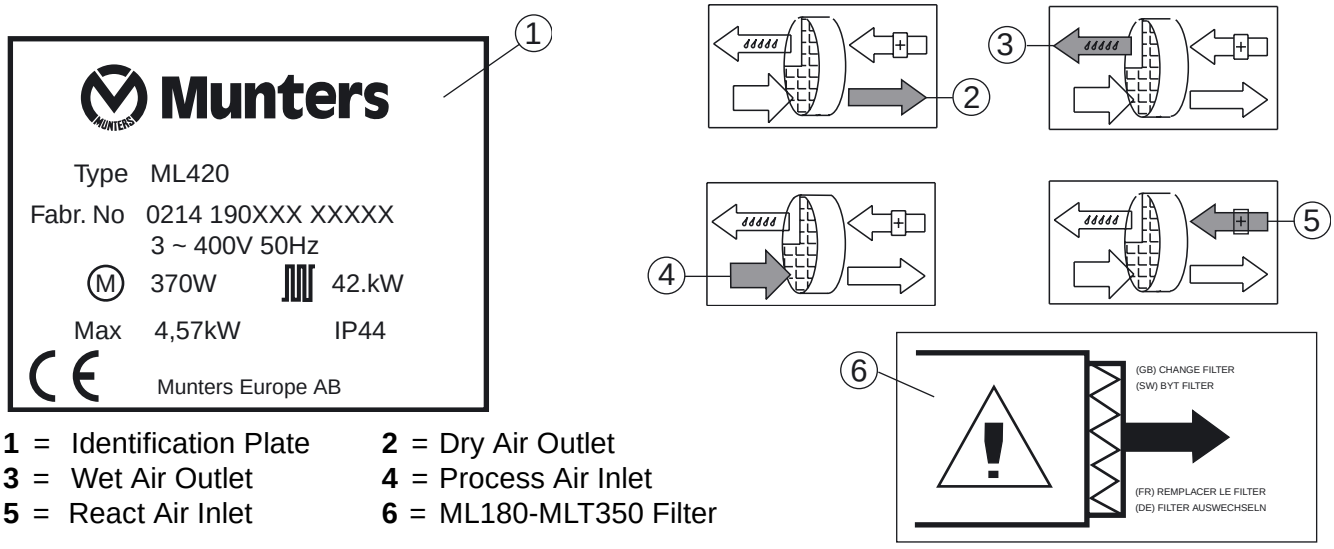


Figure 1-1. Location of labels



1 = Identification Plate
2 = Dry Air Outlet
3 = Wet Air Outlet
4 = Process Air Inlet
5 = React Air Inlet
6 = ML180-MLT350 Filter

Figure 1-2. Example of identification plate content & Label details

1.5 Operator stations

The dehumidifier is controlled and supervised with the help of the control panel, located on the front of the unit, *see figure 3-1*.

1.6 Fault indications

Faults are clearly indicated through an illuminated indicator on the control panel, *see figure 3-1*.

Alarms related to air relative humidity are indicated in the display of the RH98 (if fitted) operators panel, *see section 7.4, RH98*.

2 Installation

2.1 General

The ML Dehumidifiers intended for indoor installation.

The unit is inspected and checked prior to leaving the factory to guarantee consistent quality and maximum reliability.

If the unit is to be put into storage, prior to installation, *see section 2.5, Storing the Equipment*.

2.2 Safety

WARNING! *The dehumidifier is heavy and can weigh in excess of 50kg. To avoid accidents use only approved lifting equipment.*

WARNING! *All electrical equipment connections must be carried out in accordance with local regulations and by qualified personnel.*

WARNING! *The unit must never be connected to a voltage or frequency other than that for which is was designed and manufactured. Refer to the unit identification plate if in doubt.*

WARNING! *Ensure that the mains power is isolated from the dehumidifier prior to changing the orientation of the process and dry air connections.*

CAUTION! *The wet air ducting must always be insulated if there is a risk of freezing. Due to the high moisture content in the wet air leaving the dehumidifier condensation will readily form on the inside duct walls.*

CAUTION! *The dehumidifier has been designed to operate at specific process airflows (corresponding to the fan sizes installed) and must not be directly connected to air-conditioning systems.*

CAUTION! *Failure to correctly adjust the process and reactivation airflows could cause the unit to malfunction.*

CAUTION! *When moving the dehumidifier always consider the possible risk of the unit tipping over.*

2.3 Moving the Equipment

WARNING! *The dehumidifier is heavy and can weigh in excess of 50kg. To avoid accidents use only approved lifting equipment.*

The dehumidifier is delivered on a pallet and must be handled carefully. All panel doors of the unit must be closed during transport. Provided that the dehumidifier is still secured to its delivery pallet, it can be moved using a fork-lift truck.

CAUTION! *When moving the dehumidifier always consider the possible risk of the unit tipping over.*

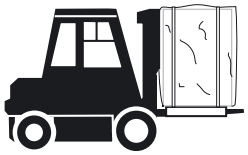


Figure 2-1. Example of moving the dehumidifier

Weight of the dehumidifier can be found in ***section 6.3, Dimensions and service space***.

2.4 Packaging and Delivery Inspection.

1. Check the delivery against the packing list, consignment note or other delivery documentation and check that everything is included and nothing is damaged.
2. Contact Munters immediately if delivery is not complete in order to avoid installation delays.
3. If the unit is to be put into storage, prior to installation, ***see section 2.5, Storing the Equipment***.

NOTE! *If the installation is not to be carried out immediately after the arrival of the equipment it is advisable to leave the packing material in place on the dehumidifier, or to re-use the packaging material to provide temporary protection for the unit during later transport to the installation location and during installation.*

4. Remove all packing material from the unit, check carefully to make sure that no damage has occurred during transport.
5. Any visible damage must be reported in writing to Munters prior to the start of installation.

2.5 Storing the Equipment

The following is important if the dehumidifier is to be stored prior to installation:

- Place the dehumidifier on a horizontal surface.
- Protect the dehumidifier from physical damage.
- Store the dehumidifier under cover and protect it from dust, frost, rain and aggressive contaminants.

2.6 Location Requirements

The dehumidifier is intended for indoor installation.

It is important that the intended installation site meets the location and space requirements for the equipment in order to achieve the best possible performance and trouble-free operation.

The unit should be placed in an upright level position inside or outside the space to be dehumidified.

For unit and service dimensions, *see section 6.3, Dimensions and service space*.

NOTE! *It is important, both for maintenance and for service, that the minimum service space for service access are compiled with.*

2.7 Process and Dry Air Connections

The front and back panels are interchangeable, so that the connections for process and dry air may be situated either on the left or right side of the unit.

ML-Series dehumidifiers are delivered with the process and dry air connections on the left side of the unit. If it is required to the change the orientation, so that the connections are on the right side of the unit, proceed as follows:

⚠ **WARNING!** *Ensure that mains power is isolated from the dehumidifier prior to changing the orientation of the process and dry air connections.*

1. Remove the two bolts (B) securing the front panel and carefully remove the panel.
2. Remove the two bolts securing the rear panel and carefully remove the panel.
3. Remove the two bolts (A) and washers, securing the control and top panels to the unit and carefully remove the top panel.
4. Remove the cable duct covers (C), re-route the cables and fit the control panel (D) to the opposite side of the unit. Refit the cable duct covers.
5. Refit the front, rear and top panels in the new position.

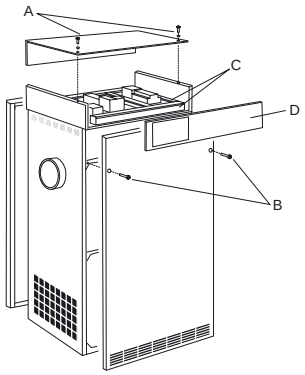


Figure 2-2. Changing panel orientation

2.8 Ducting

2.8.1 General recommendations

The connections for process and reactivation air are designed in accordance with the recommendations in ISO 7807. The rectangular duct connections contain tapped inserts for M8 bolt fixings.

CAUTION! *The dehumidifier has been designed to operate at specific process airflows (corresponding to the fan sizes installed) and must not be directly connected to air-conditioning systems.*

- When installing ductwork between the dehumidifier and the inlet and outlet connections, the following recommendations should be observed:
- The length of ductwork should be kept as short as possible to minimise static air pressure losses.
- To maintain performance, all rigid process or reactivation air ductwork joints must be air and vapour tight.
- The process air ductwork should be insulated to prevent condensation from developing on the outside of the duct whenever the temperature of the air within the duct falls below the dewpoint of the ambient air through which the ductwork is routed.
- The ducting must always be insulated when there is a risk of freezing.
- The wet air leaving the dehumidifier will, due to high moisture content, condense on the inside duct walls. This must be avoided by insulating the ducts.
- Horizontal duct-runs should be installed sloping downwards (away from the dehumidifier) to allow for condensate drainage. On the wet air outlet ducting, suitable condensate drains should be installed at low points in the ductwork. Refer to ***figure 2-3, Wet air outlet design***.
- Ensure that access for operation and servicing is not restricted when designing and installing ducting. For details refer to ***section 6.3, Dimensions and service space***.
- To reduce noise and/or vibration being transmitted along rigid ductwork, good quality, airtight flexible connections can be fitted.
- Ducts mounted directly onto the dehumidifier should be adequately supported to minimise the load and stress due to the duct weight and movement.
- Dampers for balancing the airflows must be installed in the dry air outlet and reactivation air inlet ducts. The correct airflows are essential for maintaining the operating efficiency of the unit. For airflow adjustment details, ***see section 2.15, Airflow Check and Adjustment***.

- The total resistance in the process and reactivation air ductwork must not exceed the performance rating of the fans fitted in the dehumidifier. For details of minimum available static pressure, *see section 6.5, Technical Specifications*.

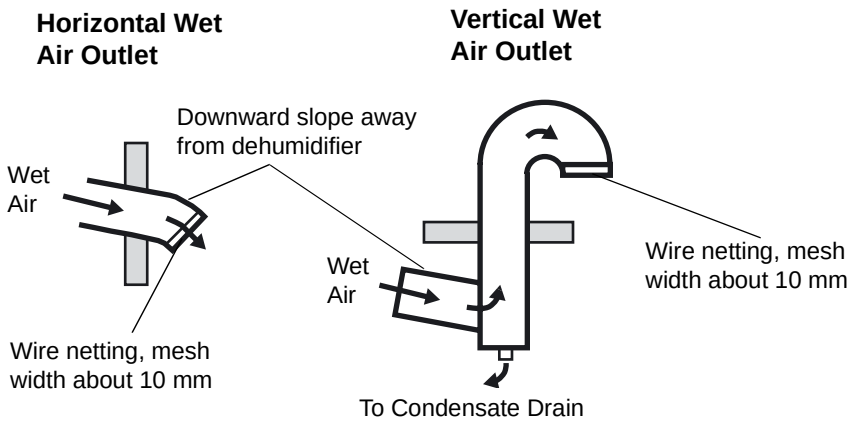

Horizontal Wet Air Outlet
Vertical Wet Air Outlet
Downward slope away from dehumidifier
Wet Air
Wire netting, mesh width about 10 mm
Wet Air
Wire netting, mesh width about 10 mm
To Condensate Drain

Figure 2-3. Wet air outlet design

2.8.2 Ductwork for Outdoor Air Inlet

When bringing outside ambient air into the dehumidifier, the opening to the inlet duct should be sufficiently located above ground level to prevent the pick-up of dust and debris. The ducting should be designed to prevent rain and snow from being drawn into the dehumidifier. The air inlet must be located away from possible contaminations such as engine exhaust gases, steam and harmful vapours.

To prevent the wet (outlet) air humidifying the reactivation (inlet) air, the air inlet for reactivation must be located at least 2m from the air outlet for wet air Refer to ***figure 2-4, Outdoor air inlet design***.

2.8.3 Ductwork for Wet Air Outlet

Wet air ducting should be manufactured in corrosion resistant material (e.g. stainless steel, aluminium or plastic) and should be capable of withstanding temperatures of up to 100°C.

CAUTION! *The wet air ducting must always be insulated if there is a risk of freezing. Due to the high moisture content in the wet air leaving the dehumidifier condensation will readily form on the inside duct walls.*

Horizontal duct-runs must therefore be installed sloping downwards (away from the dehumidifier) to allow for condensate drainage. The slope should be a minimum of 2cm per meter duct. In addition, 5mm drain hole should be drilled at the low points in the duct to prevent water accumulating in the duct. ***See figure 2-3, Wet air outlet design***.

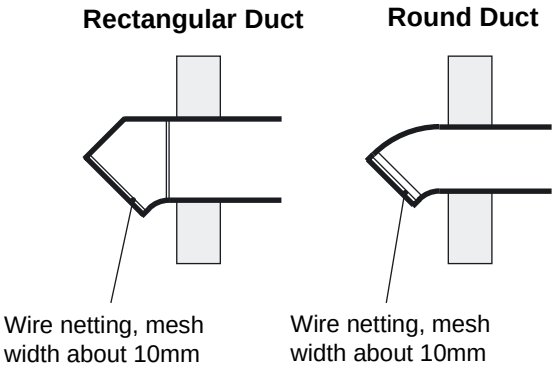


Figure 2-4. Outdoor air inlet design

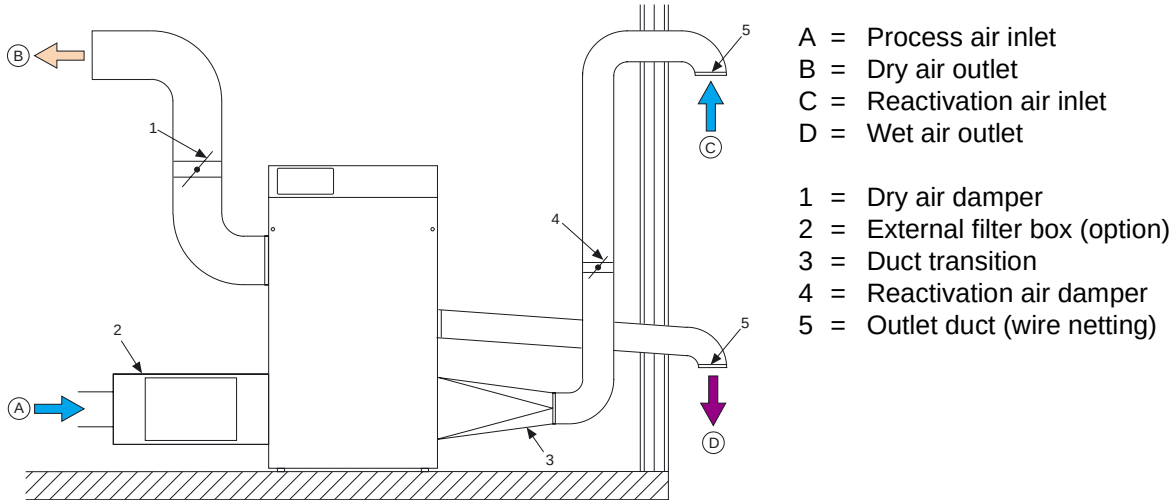

A = Process air inlet
B = Dry air outlet
C = Reactivation air inlet
D = Wet air outlet
1 = Dry air damper
2 = External filter box (option)
3 = Duct transition
4 = Reactivation air damper
5 = Outlet duct (wire netting)

Figure 2-5. Required ductwork

2.9 Precaution for unit using LI desiccant rotor

To prevent the lithium chloride (LI) desiccant rotor becoming overloaded when the dehumidifier has been switched off, air with a relative humidity exceeding 80% must not pass through the rotor!

It is recommended to install motorized and air tight shut-off dampers in the inlet process and reactivation air openings to the dehumidifier. This is to prevent air with a very high relative humidity from inadvertently being drawn through the rotor by a chimney effect created by ancillary equipment.

This is particularly important when the process air is drawn from outdoors, or the system has been fitted with a pre-cooler. Failure to observe these precautions could result in a serious loss of performance and may cause permanent damage to the rotor.

2.10 Installation Examples

2.10.1 Closed System

The closed airflow system is mainly used where the room to be dehumidified contains little or no ventilation, and is partially sealed.

A closed airflow system offers the advantage of simple design and therefore low installation costs. Usually a closed system will minimise the size of the dehumidifier required, and because the environment is partially sealed, the operating costs for the dehumidifier will also be minimised.

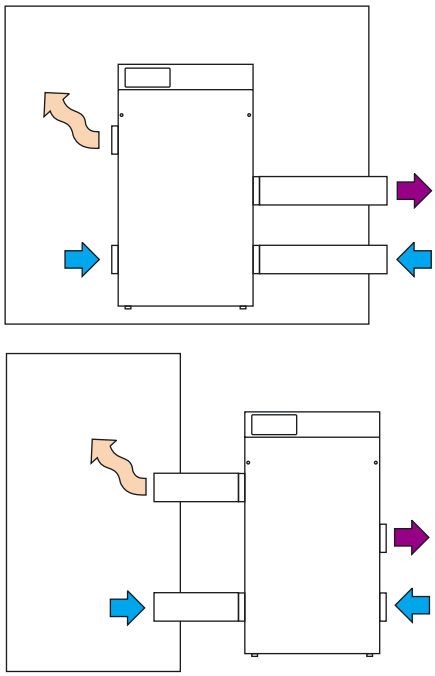


Figure 2-6. Closed Airflow System

2.10.2 Open System

Open airflow systems can be utilized in place of closed systems to overcome the following problem areas:

- High level of dust or corrosive particles in the room.
- Harmful gasses or vapours which must not be recirculated.
- Problems arranging air recirculation where several rooms are served by the same dehumidifier. Specially where recirculated air must not be mixed.
- A pressured environment is desired to prevent uncontrolled infiltration of humid air, particularly where low relative humidity is required.

When an open airflow system is installed, all leaks in the airflow much be controlled within an acceptable tolerance.

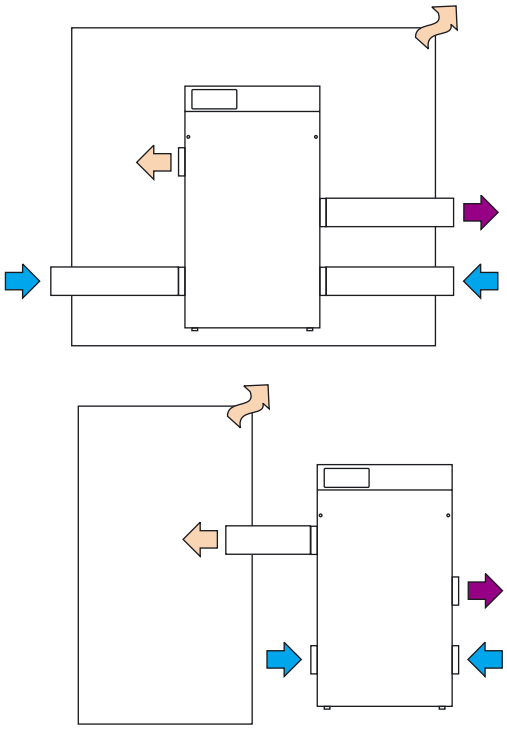


Figure 2-7. Open Airflow System

2.11 Electrical Connections

2.11.1 Mains Supply

WARNING! *All electrical equipment connections must be carried out in accordance with local regulations and by qualified personnel.*

WARNING! *The unit must never be connected to a voltage or frequency other than that for which it was designed and manufactured. Refer to the unit identification plate if in doubt.*

ML180 & MLT350 dehumidifiers are supplied complete with a pre-wired mains cable. The cable is fitted with a multi-pin plug suitable for connection to a single phase earthed mains socket.

The ML270 is designed for 3-phase AC operation. Each unit is supplied complete with all the internal wiring installed and configured in accordance with the specified voltage and frequency on the identification plate.

ML270 (only): We strongly recommend that an external isolator be installed and placed close to the ML270 unit. The isolator can be used to switch of the power to the unit in case of an emergency.

NOTE! *Supply voltage must not vary more than 10% of the specified operating voltage. The unit must be adequately connected to earth.*

ML270 (only): The power supply cables must be of the correct size for the dehumidifier being installed.

For connection details refer to the *identification plate* and *Electrical Circuit Supplement* or refer to ***section 6.5, Technical Specifications***.

2.12 External Humidistat

ML-Series dehumidifiers are pre-wired so that when the unit is in the AUTomatic mode it can be controlled by an externally mounted humidistat.

ML180-MLT350 have been designed with a one-step heater, and therefore control is limited to switching the unit on and off using a one-step humidistat.

A low voltage connector (mounted on the side of the unit) is provided for electrical connection of a single-stage humidistat. For details refer to the units *Circuit Diagram Supplement*.

2.12.1 Location Requirements

The humidistat should be mounted 1-1.5m above the floor and positioned so that it is not exposed directly to dry air from the unit or incoming moist air from opening and closing doors. It may not be placed close to a heat source or so that it is exposed to direct sunlight.

2.12.2 Electrical Specifications

- The humidistat connecting cable should have a conductor cross-sectional area of not less than 0,75 mm^2 and must have an insulation resistance rating in excess of 500 VAC.

- The humidistat must be electrically compatible with the dehumidifier's extra low voltage control circuit.
- The humidistat must be designed so that the contacts close on a rising RH to complete the control circuit and start the dehumidifier.
- Voltage drops may be experienced when using excessively long cables.

At operation, the voltage must be 24VAC measured at the dedicated terminals, used for connecting the humidistat to the dehumidifier. If the measured voltage is less than 20VAC, a separate relay controlled by the humdistat must be used.

2.13 Pre-Start settings

ML180-MLT350 units are equipped with a number of standard features requiring a few selections and settings before the unit is put in operation for the first time.
Some features require connection of external equipment. For wiring details refer to the *Circuit Diagram Supplement* supplied with this unit.

2.13.1 One-step humidistat

NOTE! *Where no humidistat is connected to the unit, the dehumidifier will be operating at maximum output for as long as the unit is switched on.*

Where a one-step humidistat is fitted, the dehumidifier will switch on and off under the control of the humidistat. The one-step humidistat is connected in accordance with the *Circuit Diagram Supplement.*

2.14 Pre-Start Checks

Before starting the dehumidifier for the first time, ensure that the mains power supply is isolated from the dehumidifier and carry-out the following checks:

1. Check that the Mode switch on the dehumidifier is in the "OFF" position, ***see figure 3-1, Control Panel***.
2. Check the air intake filters for damage and proper fixation and also check that all areas inside the unit are clean.
3. Visually inspect all ducting and duct connections to make sure that all connections have been correctly installed and that there are no signs of damage to the system. Also check that all ducts are free from obstacles blocking the air passage.
4. Remove the top panel and check that none of the main contact breakers in the electrical control panel have been tripped. For details refer to the wiring diagrams provided with the unit.
5. Check that the incoming power supply voltage is correct and that the cables are correctly connected.
6. If a humidistat has been installed, check that it has been correctly positioned in the room and has been correctly connected to the unit, ***see section 2.12, External Humidistat***.

7. The ML270 has a 3 phase fan motor and the rotation direction of the fan impeller must be checked after connection to the power supply. Open the front panel of the dehumidifier and take out the process filter. Start the dehumidifier and check that the fan impeller is rotating. Stop the dehumidifier and observe the impeller just before it stops rotating to check that the rotation direction is clockwise.

8. If a RH98 has been installed, check that the sensor has been correctly positioned in the room and has been correctly connected to the unit, ***see appendix 7.4, RH98***.

9. Set the process and reactivation airflow dampers to the fully open position.

2.15 Airflow Check and Adjustment

2.15.1 General

To obtain the design performance, the dry air and reactivation airflow dampers must be correctly adjusted in accordance with the rated airflow, ***see section 6.5, Technical Specifications***.

If required contact Munters Product Service to receive help with commissioning the dehumidifier installation, *see addresses on the back cover of this manual for your local Munters representative.*

CAUTION! *Failure to correctly adjust the process and reactivation airflows could cause the unit to malfunction.*

1. Using the dampers installed in the dry air outlet and reactivation air inlet ducts, adjust the process and reactivation airflows to the correct rated airflow.

2. Start the dehumidifier and let it run on full power for approximately 5 minutes to allow the reactivation heater to reach its normal operating temperature. Refer to ***Chapter 3, Operation***.

3. Check that the temperature differential between the reactivation supply air and the reactivation air (indicated on the temperature display) is 95°C (tolerance ±5°C).

4. If the temperature differential is out of tolerance limit by 5%, adjust the reactivation air damper in small stages allowing the temperature display to stabilise after each adjustment) until reactivation temperature reading is within the specified tolerances.

.

Symbols:
t_i = Inlet air temperature (°C)
t_u = Reactivation air temperature (°C)

Example:
Inlet air temperature (t_i) = 15°C
Reactivation air temperature = 110°C
Temperature increase = 95°C

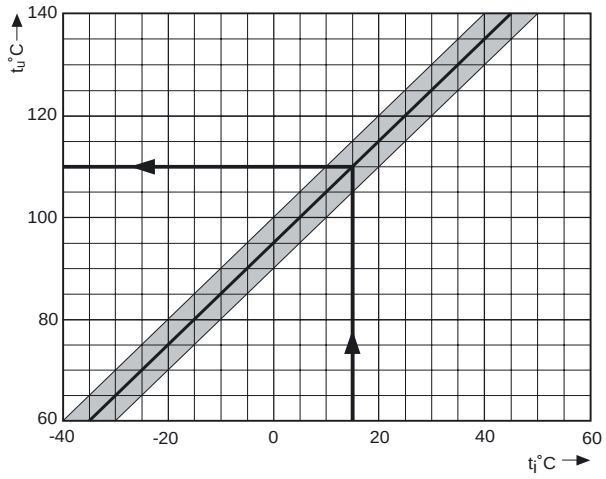


Figure 2-8. Airflow Chart

3 Operation

3.1 General

The ML180-MLT350 dehumidifiers are equipped with a control panel that contains mode switches and LED indicators.

The mode switch of the control panel has two operating modes:

MAN (Manual mode)

The dehumidifiers fan, rotor and reactivation heater operate continuously with full capacity.

AUT (Automatic mode)

The dehumidifiers fan, rotor and reactivation heater operate when the Relative Humidity rises above the desired value.

3.2 Safety

CAUTION! *To prevent damage to the fans, the unit must not be run for longer than a few minutes prior to setting-up the process and reactivation airflows.*

CAUTION! *Failure to correctly adjust the process and reactivations airflows could cause the unit to malfunction.*

3.3 Emergency stop

ML180 & MLT350

To start and stop the unit in normal operation the Run/Stop switch is used. In case of an emergency unplug the unit from the wall outlet.

ML270

To start and stop the unit in normal operation the Run/Stop switch is used. In case of an emergency switch the unit off using the external isolator (if fitted).

3.4 Pre-Start Checks

Before starting the dehumidifier for the first time, carry out checks according to ***section 2.14, Pre-Start Checks*** and ***section 2.15, Airflow Check and Adjustment***.

3.5 Operating the unit

3.5.1 Manual Mode

1. Ensure the Run/Stop switch is set to the ▽ position.
2. Operate the mode switch to the **MAN** position.
3. Connect mains power to the unit and ensure that the power connected indicator is illuminated.
4. Operate the run/stop switch to the → position. Ensure that the unit running indicator is lit and the unit is operating.

5. Operate the run/stop switch to the ▽ position and check that the unit stops and that the unit running indicator goes out.

For details on the Control panel, *see figure 3-1, Control Panel*.

3.5.2 Automatic Mode - Humidistat

For the unit to operate in the **AUTO**matic mode a one-step humidistat must be installed and correctly connected to the unit. For details *see section 2.12, External Humidistat*.

1. Set the mode switch to the **AUTO** position.
2. Adjust the humidistat set point for the minimum relative humidity (RH) value. Operate the run/stop switch to the —▷ position. Ensure that the unit running indicator is lit and the unit is operating.
3. Slowly increase the humidistat set-point and check that the unit switches off when the set-point matches the RH in the room where the humidistat is installed. Check that the unit running indicator remains on.
4. Slowly decrease the humidistat set-point and check that the unit switches on when the set-point falls below the RH in the room where the humidistat is installed.
5. Operate the run/stop switch to the ▽ position and check that the unit stops and that the unit running indicator goes out.
6. Reset the humidistat to the desired set-point.

For details on the Control panel, *see figure 3-1, Control Panel*.

3.5.3 Automatic Mode - RH98

If the unit has been supplied with a factory fitted RH98 control system (option) the external transmitter must be installed and correctly connected to the unit. The same location requirements are valid for the humidistat and the RH98, *see section 2.12, External Humidistat*. For details on operation *see section 7.4, RH98*.

1. Set the mode switch to the **AUTO** position.
2. Adjust the RH98 set point for the minimum relative humidity (RH) value. Operate the run/stop switch to the —▷ position. Ensure that the unit running indicator is lit and the unit is operating.
3. Slowly increase the RH98 set-point and check that the unit switches off when the set-point matches the RH in the room where the humidity transmitter is installed. Check that the unit running indicator remains on.
4. Slowly decrease the RH98 set-point and check that the unit switches on when the set-point falls below the RH in the room where the humidity transmitter is installed.

5. Operate the run/stop switch to the ▽ position and check that the unit stops and that the unit running indicator goes out.

6. Reset the RH98 to the desired set-point.

For details on the Control panel, *see figure 3-1, Control Panel*.

3.6 Control Panel

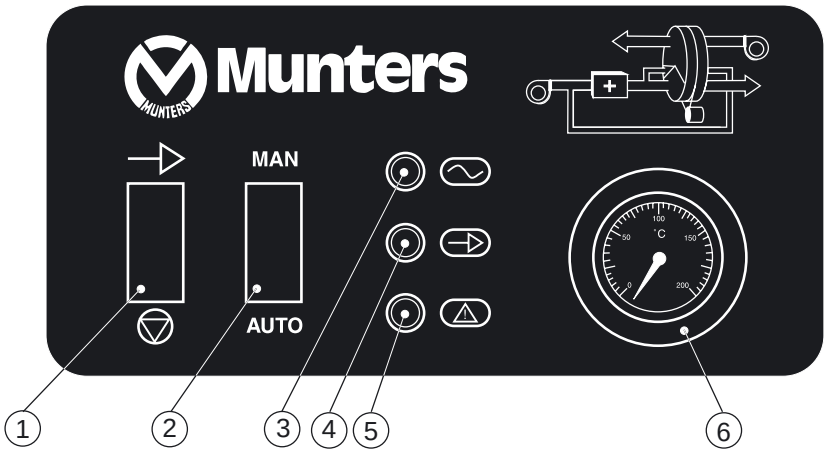


Figure 3-1. Control Panel

Item	Switch/Indicator	Function
1	Run/Stop Switch	With the run/stop switch selected to the ▽ position, the unit is switched off. With the mode switch in the "**MAN**" position, operating the run/stop switch to the ▷ position will start the dehumidifier. With the mode switch in the "**AUTO**" position, operating the run/stop switch to the ▷ position will allow an external humidistat or RH98 to control the operation of the dehumidifier.
2	Mode Switch	With the mode switch in "**MAN**" position, the dehumidifier will operate in the manual mode. In this mode the unit will run continuously when the run/stop switch is operated to the ▷ position. With the switch in the "AUTO" position, the dehumidifier will operate in the automatic mode. In this mode a humidistat or RH98 must be connected to the unit. When the run/stop switch is operated to the ▷ position, the humidistat or RH98 determines when the dehumidifier will start and stop.
3	Power Connected Indicator	Indicates that mains power is connected to the dehumidifier.
4	Unit Running Indicator	Indicates that the dehumidifier is running, or is ready to start on a signal from the humidistat or RH98 (automatic mode).
5	Fault Warning Indicator	Indicates that the unit has shut-down due to the control circuit detecting that either the high temperature cut-out or the fan motor overload has tripped. For units fitted with an air cooled condenser, the fault warning indicator is activated when there is a condenser fan or heater fault.
6	Temperature Gauge	Indicates the Reactivation Air temperature.
7	Running time meter [1]	Indicates the number of hours that the dehumidifier has been operating.

[1] Optional component

Table 3-1. Function of the Control Panel

4 Maintenance

4.1 General

Munters dehumidifiers are designed for long, continuous operation with minimum attention. Under normal operating conditions, requirements for maintenance are minimal.

Maintenance interval lengths are primarily determined by operating conditions and the environment in which the unit is installed. When in doubt, consult Munters' product service department. See addresses for Munters representatives on the back cover of this manual.

4.2 Safety

WARNING! *Adjustments, maintenance and repairs may only be carried out by qualified personnel who are aware of the risks involved during the maintenance of equipment containing high electrical voltage and high machine temperatures.*

4.3 Maintenance Schedule

The following maintenance schedule is recommended by Munters and covers procedures for inspection and maintenance as well as suggested time intervals for a unit that operates under normal operational and environmental conditions.

If the process air has a high dust content, preventative scheduled maintenance should be performed at shorter intervals than what is specified.

Component	Inspection/Maintenance Procedure	
	3-6 Months	12 Months
Process and reactivation filter	Clean filter housing and change filter if dirty.	Clean filter housing and change filter.
Dehumidifier housing	Check for physical damage and clean unit externally and internally as necessary.	Check for physical damage and clean unit externally and internally as necessary.
Process and reactivation fans	Check for physical damage and clean the fan motor housing as required.	Remove all dirt and dust in the motor cooling air intakes. Check the motor electrical connections and make sure they are properly tightened. Inspect for damage and over-heating. Check the fan impellers for damage and clean if necessary.
Drive motor assembly	Check the drive belt tension and adjust if necessary.	Check the drive motor electrical connections and make sure they are properly tightened. Inspect the drive motor for damage or over-heating.
Rotor and sealing	Check for overheating and clogging. Remove dust accumulation on the frontal area of the rotor if necessary. Check the seals for damage or wear.	Check for overheating and clogging. Remove dust accumulation on the frontal area of the rotor if necessary. Use a vacuum cleaner, not compressed air. Check the seals for damage or wear.
Electrical panel and cables	Inspect the components in the electrical panel for damage or overheating.	Inspect the components in the electrical panel for damage or overheating. Check the seals at cable entries. Check that the electrical terminals are properly tightened. Remove dirt and dust around all components.
Reactivation heater		Check all cables, pipes etc. and control devices with respect to safety. Check electrical connections and make sure they are properly tightened.
Ducting connections	Check for air leakage and proper attachment to the unit.	Check for air leakage and proper attachment to the unit. Check for dirt inside the ducting and for physical damage.
Humidistat or humidity transmitter	N/A	Check sensor functions and calibrate or replace if necessary.

Table 4-1. Maintenance plan

5 Fault Finding

5.1 General

The purpose of this chapter is to provide guidance in basic fault finding and provide instructions for corrective actions so as to remedy faults. Wiring diagrams can be provided to assist with fault isolation.

5.2 Safety

WARNING! *Adjustments, maintenance and repairs may only be carried out by qualified personnel who are aware of the risks involved during the maintenance of equipment containing high electrical voltage and high machine temperatures.*

5.3 Exchangeability

All electrical equipment in the electrical panel can be exchanged for new components as provided in the list of components, *see Circuit Diagram Supplement.*

The changing of rotors and/or rotor drive mechanism must be carried out by Munters recommended and trained personnel.

The changing of reactivation heater must be carried out by Munters recommended and trained personnel.

Drive belts and fans can be changed for one of the same type. After a fan has been changed, the airflow must be adjusted and an operational test must be carried out.

Switches and sensors can be changed to one of a corresponding type. After a change an operational test must be carried out.

5.4 Fault localization

The LEDs alarm message shown on the control panel are the primary source of information for finding faults when the unit has given an alarm and stopped automatically.

Go through the following fault localization list below before contacting Munters' product service department. The list provides help in identifying types of faults that are easy to remedy without the assistance of specially trained personnel.

If the unit is equipped with RH98 Humidity Control System, ***see section 7.4.4, Process related alarms***.

Fault Symptom	Indicators	Possible cause	Action
Unit has stopped	All off	Power supply failure Transformer TC18 fuse FU18 failure.	Check power supply to the unit. Investigate the cause of the fault and rectify. Reset the fuse.
Unit has stopped	No.3 & 4 are on	Unit switched to **AUTO**matic mode by mistake with no humidistat connected. Humidistat fault (**AUTO**matic mode).	Set the mode switch to **MAN**ual mode and check that the dehumidifier starts. Set the mode switch to **MAN**ual mode and check that the unit starts. If the unit starts, the humidistat is probably at fault. Set the mode switch to **AUTO**matic mode and check the humidistat by seeing if the dehumidifier starts when the humidistat set-point is reduced. Reset the humidistat set-point after the check. Calibrate the humidistat (in accordance with the manufacturer's recommendations) if necessary or replace.
Unit has stopped	No.5 & 3 are on	High temperature cut-out (BT20) has tripped. Reactivation airflow is set too low.	Switch off the mains supply and allow the unit to cool down. Check that the air inlet, outlet ducts and filters are free from obstructions and are not clogged with dirt. Reset the cut-out when the unit has cooled down. Reset the cut-out. Restart the unit and adjust the reactivation airflow, *see section 2.15, Airflow Check and Adjustment*.
Unit has stopped	No.5, 3 & 4 are on	**ML180 & MLT350:** Circuit Breaker QM12 tripped due to a drive motor, fan fault or reactivation heater fault. **ML270:** Circuit Breaker QM12 tripped due to a drive motor or fan motor fault. Circuit Breaker QM15 tripped due to a reactivation heater fault. Air cooled condenser models: **ML180 & MLT350:** Circuit Breaker QM12 tripped due to a drive motor, fan fault, condenser fan fault or a condenser heater fault. **ML270:** Circuit Breaker QM12 tripped due to a drive motor, fan fault, condenser fan fault or a condenser heater fault. Circuit Breaker QM15 tripped due to a reactivation heater fault.	Switch off the mains supply and allow the unit to cool down. Reset Circuit Breaker QM12 . Investigate the cause of the fault and rectify or call Munters Product Service. Switch off the mains supply and allow the unit to cool down. Reset Circuit Breakers QM12 and QM15. Investigate the cause of the fault and rectify or call Munters Product Service. Investigate the cause of the fault and rectify or call Munters Product Service. Reset QM12. Investigate the cause of the fault and rectify or call Munters Product Service. Reset QM12 and QM15.
Loss of performance: Dehumidifier appears to be operating correctly, but is not controlling the humidity		Heating capacity is too low. Reactivation and process airflows are not in accordance with the rated airflow. Rotor drive failure. Humidistat or RH98 not functioning correctly (AUTOmatic mode).	Check the operation of the heater. Measure and adjust the reactivation and process airflows, *see section 2.15, Airflow Check and Adjustment*. Check rotor drive belt and drive motor. Check the operation and calibration of the humidistat or RH98 in accordance with the manufacturer's recommendations.

Table 5-1. Fault localization

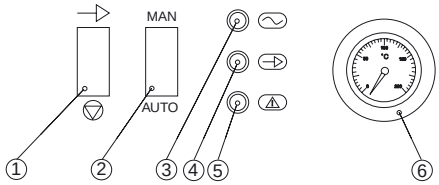


Figure 5-1. Control Panel

6 Product Design Information

6.1 Product Description

The ML-Series desiccant dehumidifiers are designed to efficiently dehumidify in low moisture applications. They are equipped with an internally sealed rotor unit. The rotor casing is constructed of durable thermoset plastic and contains isolated sections that provide a precise balance for dehumidification, reactivation, and heat recovery airflows. Its rugged formed metal frame and access panels are produced from corrosion resistant ALUZINK®.

The electrical control system conforms to EN 60204 (IEC204) standards. The electrical components are mounted on busbars and are constructed of halogen-free plastic. The electrical system is designed for up to 690V and 60°C. ML Series dehumidifiers conform to both harmonised European Standards and to CE marking specifications.

6.2 Principal of operation

The desiccant rotor structure comprises of a large number of narrow and parallel air channels, processed to a composite material that is highly effective at attracting and holding water vapour.

The rotor is exposed in sectors to different airflows. The airflow that is to be dehumidified is called **process air** and passes through the largest sector of the rotor. The moisture in the **process air** is deposited into the rotor structure and the **process air** will then leave the rotor as **dry air**. While the rotor rotates slowly the incoming **process air** always meets a dry rotor structure, thus creating a continuous dehumidification process.

The airflow that is used to reactivate (dry) the rotor structure is called reactivation air and is first heated. Passing through the smallest sector of the rotor, in the opposite direction to the process airflow, the reactivation air removes the deposited moisture and leaves the rotor as wet air (warm, moist air).

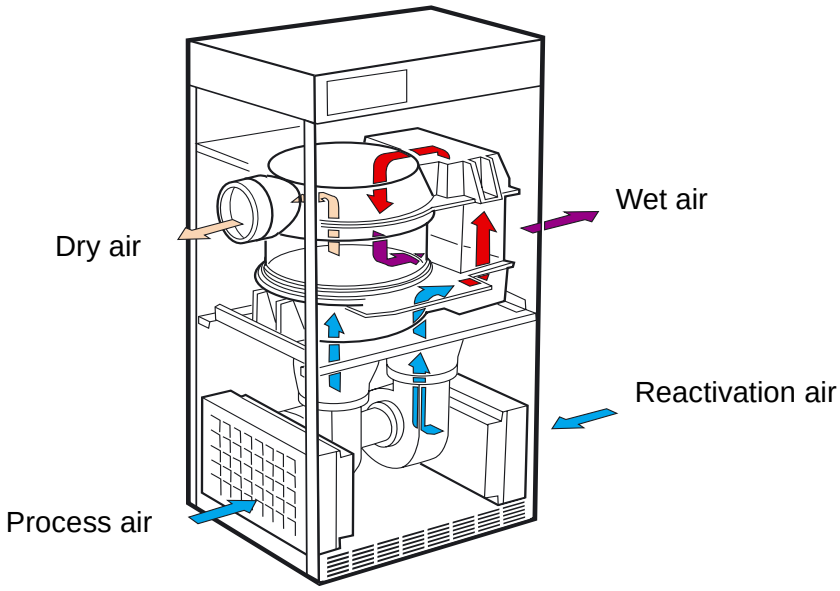


Figure 6-1. Principal of operation

6.3 Dimensions and service space

Scaled and dimensioned AutoCAD drawings are available in Munters' DryCAD program (can be ordered at the nearest Munters office).

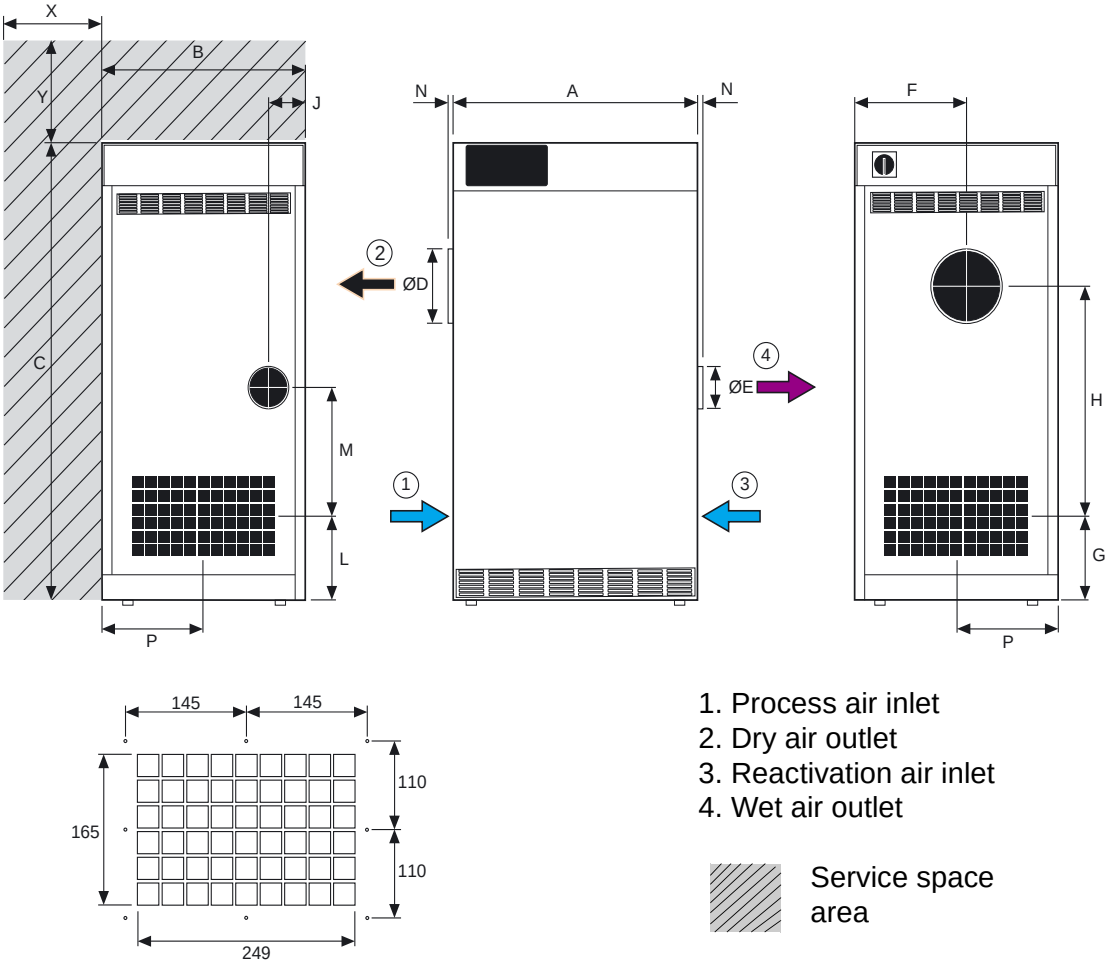


Figure 6-2. Dimensions & service space

Model	Dimensions															Weight (kg)
	A	B	C	ØD	ØE	F	G	H	J	L	M	N	P	X[1]	Y[1]	
ML180	513	410	910	125	80	220	170	500	135	170	250	45	175	450	400	56
MLT350	513	410	910	125	80	220	170	500	135	170	250	45	175	450	400	56
ML270	513	410	1010	160	100	220	170	600	135	170	250	450	175	450	400	63

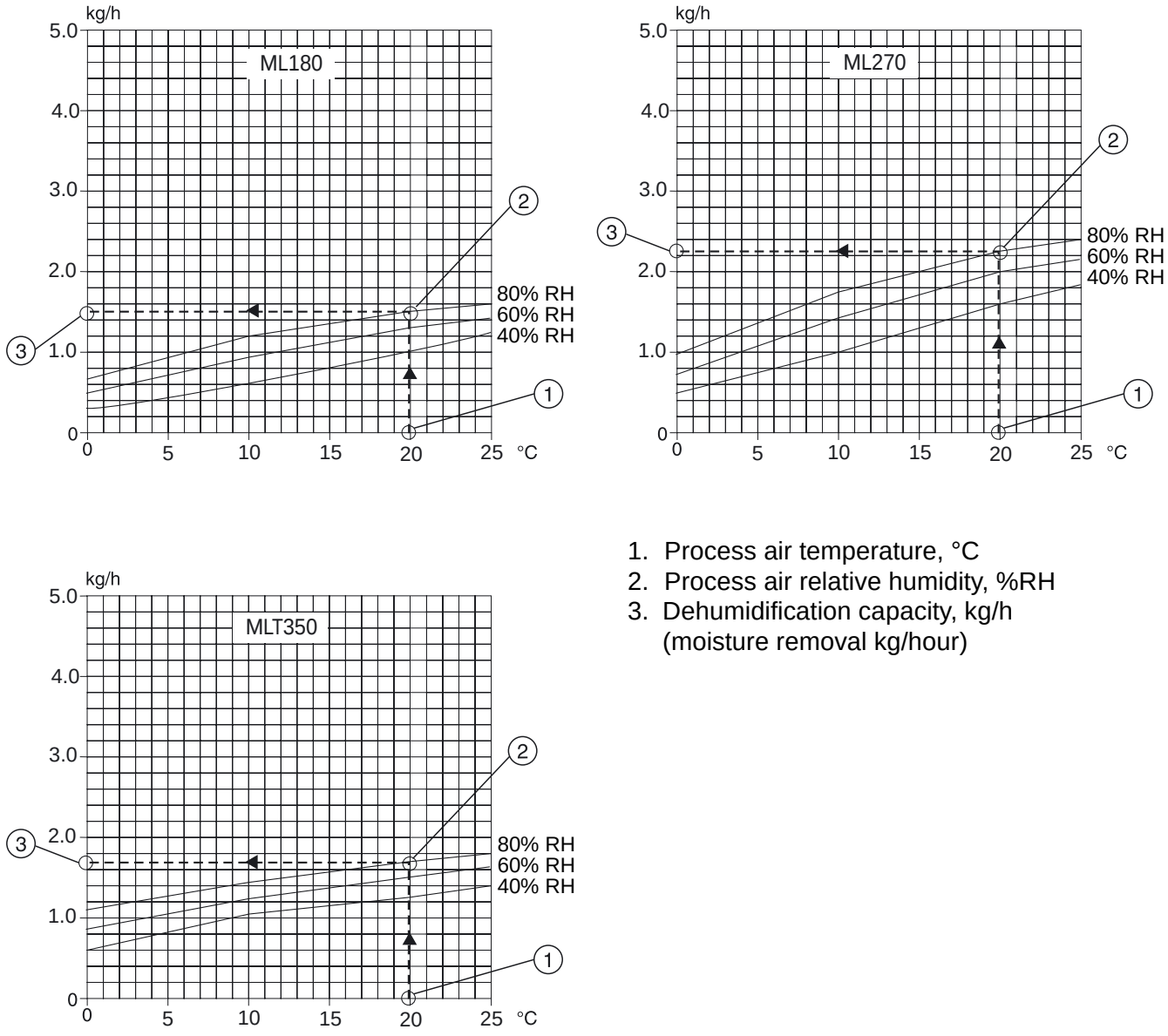
[1] *Access space required for servicing*

Table 6-1. Dimensions and service space

6.4 Capacity Diagrams

Approximate capacity in kg/h.
For detailed information, please contact your nearest Munters office or refer to Munters' DryCap program.

NOTE! *The below figures are based on a nominal (1/1) airflow.*



1. Process air temperature, °C
2. Process air relative humidity, %RH
3. Dehumidification capacity, kg/h (moisture removal kg/hour)

Figure 6-3. Capacity Diagrams

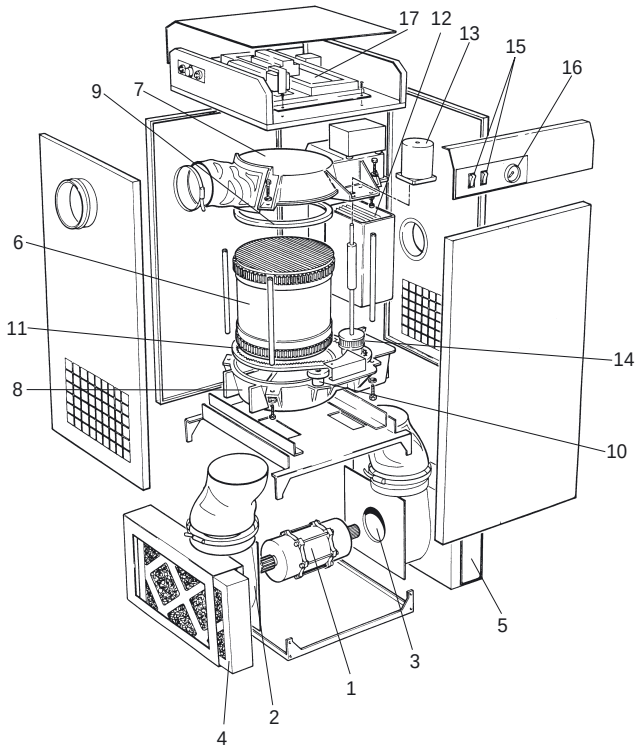
6.5 Technical Specifications

Model	ML180	ML270	MLT350
Process Air[1]			
Rated Airflow (m^3/s)	0,05	0,075	0,097
Rated Airflow (m^3/h)	180	270	350
Min. available static pressure (Pa)[2]	200	200	200
Fan Motor power (kW) at 50Hz[3]	0,25	0,36	0,25
Fan motor power (kW) at 60Hz[3]	0,25	0,36	0,25
Reactivation Air[1]			
Rated Airflow (m^3/s)	0,019	0,027	0,019
Rated Airflow (m^3/h)	67	99	67
Min. available static pressure (Pa)	200	200	200
Fan Motor power (kW) at 50Hz[3]	-	-	-
Fan motor power (kW) at 60Hz[3]	-	-	-
Rated Current			
Current (Amps/Phase) 1~ 50Hz 220V	9,9	-	9,9
Current (Amps/Phase) 1~ 60Hz 220V	9,9	-	-
Current (Amps/Phase) 1~ 50Hz 230V	9,5	-	9,5
Current (Amps/Phase) 1~ 50Hz 240V	9,2	-	9,2
Current (Amps/Phase) 3~ 50Hz 220V	-	8,5	-
Current (Amps/Phase) 3~ 60Hz 220V	-	8,5	-
Current (Amps/Phase) 3~ 50Hz 230V	-	8,2	-
Current (Amps/Phase) 3~ 60Hz 230V	-	8,1	-
Current (Amps/Phase) 3~ 50Hz 380V	-	5,0	-
Current (Amps/Phase) 3~ 60Hz 380V	-	5,0	-
Current (Amps/Phase) 3~ 50Hz 400V	-	4,7	-
Current (Amps/Phase) 3~ 50Hz 415V	-	4,6	-
Current (Amps/Phase) 3~ 60Hz 440V	-	4,3	-
Current (Amps/Phase) 3~ 60Hz 460V	-	4,1	-
Current (Amps/Phase) 3~ 60Hz 480V	-	4,0	-
Current (Amps/Phase) 3~ 50Hz 500V	-	3,8	-
Reactivation Heater			
Temperature increase across heater (°C)	95	95	95
Reactivation heater power (kW)	1,8	2,7	1,8
Miscellaneous Data			
Drive Motor Power (W)	5	5	5
Air Filtration (Standard)	EU3	EU3	EU3
Dust and Water Resistance (Main Case)	IP44	IP44	IP44
Dust and Water Resistance (Electrical Controls)	IP54	IP54	IP54
Fan Motor Winding Insulation Grade	Class F	Class F	Class F
Drive Motor Winding Insulation Grade	Class F	Class F	Class F
High Temperature Cut-Out (°C)	160 ± 5	160 ± 5	160 ± 5
Contactor Coil Voltage	24Vac		
Max. Noise Level Unducted (dBA)	80 dBA		

[1] Figures quoted are nominal, based on fan inlet temperature of 20°C, and an air density of 1,2kg/m^3.
[2] Without optional F5 or F7 filter boxes.
[3] ML180, ML270, MLT350 dehumidifiers have a single motor driving both process and reactivation air fans.

Table 6-2. Technical Specifications

6.6 Unit's main components



1 Fan Motor
2 Process Impeller
3 Reactivation Impeller
4 Process Filter
5 Reactivation Filter
6 Rotor
7 Rotor Cover Upper
8 Rotor Cover Lower
9 Rotor, Sealing Ring
10 Roller, Belt Guide
11 Drive Belt
12 Reactivation Heater
13 Drive motor
14 Pulley, Belt Drive
15 Switch (rocker, 2-pole)
16 Temperature Indicator
17 Electrical Control Panel

Figure 6-4. General Assembly

7 Appendix 1- Options

7.1 General

ML180-MLT350 dehumidifiers have been designed to ensure that options can be incorporated with the minimum external physical alteration.

For connections details refer to the *Circuit Diagram Supplement* provided with the unit.

NOTE! *Voltage drops may be experienced when using excessively long cables. At operation the voltage must be 24V measured at the connection point (dehumidifier) for **ALL** external humidistat and remote switch connections. If the measured voltage is less than 20V, a separate relay controlled by the humidistat must be used.*

7.2 Configuration alternatives

This appendix includes information about all configurations and components that can be added when ordering ML dehumidifiers.

7.3 Running Time meter

The running time meter indicates accumulated number of hours the dehumidifier has been in dehumidifying operation. The two digits to the right indicated percentage of one hour, e.g. 0000475 should be read as four hours and 45 minutes. The running time meter is not re-setable.

7.4 RH98

7.4.1 General

Checking and changing set points and control parameters can be made during operation or in stand-by mode.

NOTE! *For information regarding the sensors/transmitters, please refer to the RH98 User's Manual.*

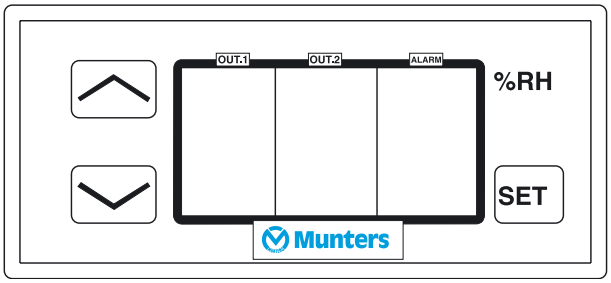


Figure 7-1. Operator panel

The push buttons have the following main functions:

SET	Display/change the required value and reset alarm
^	Increase value
v	Decrease value
% RH	Display position of control steps for reactivation heater (0=off; 1=on).

During normal operation and in any position of the mode switch the current relative air humidity is displayed.

7.4.2 Display / change setpoint of relative humidity

1. Press/release **SET** button. The point on the bottom right-hand corner of the display starts to flash indicating current setpoint. The display returns after approx. 20 sec.automatically to normal i.e. displaying current relative air humidity.
2. Press and hold **SET** button and current setpoint is steadily displayed. If the button is released again the display starts to flash before it automatically returns to normal.
3. Press and hold **SET** button and press simultaneously v or ^ buttons in order to set the required setpoint.
4. Release **SET** button and display starts to flash indicating the new setpoint before it returns automatically to normal i.e. displaying current relative air humidity.

7.4.3 Display / change of other parameters

The control setpoint is pre-set at the factory to 50 %RH. In addition to the setpoint a number of internal settings are also possible, e.g. differential, sensor offset and setpoint range, *see Table 3-1.*

1. Press and hold v for more than 10 sec. to display the parameter menu. The top and bottom segment in the left-hand display characters start to flash. Parameter 10 is displayed. Release v.
2. Press v or ^ to select a parameter. ***See table 7-1. Operator panel system parameters***.
3. Press and hold **SET** button in order to display the current value of the selected parameter.
4. Press and hold **SET** button and press v or ^ to increase or decrease the parameter value.
5. Release **SET** button. The new parameter settings are automatically saved. The display returns after approx. 20 sec. automatically to normal, i.e. displaying current relative air humidity.

Parameter	Description	Possible parameter selection	Factory setting
05	Correction of the humidity transmitter's read-off value	0 %RH	No settings
10	OFF/ON interval, stage1	1-15 %RH	2 %RH[1]
11	Offset stage 1	-15- +15 %RH	-1 %RH
12	OFF/ON interval, stage 2	1-15 %RH	6 %RH[2]
13	Offset stage 2	-15- +15 %RH	-1 %RH
14	OFF/ON interval alarm output	1-15 %RH	1%RH
15	Offset from set point, alarm output	-15- +15 %RH	0 %RH
30	Alarm limit type: Absolute limit or relative to set-point	0 = Not activated 1 = Absolute; 2 = Relative	2
31	Minimum alarm limit	-100 - +100 %RH	-50 %RH
32	Maximum alarm limit	-100 - +100 %RH	10 %RH
33	Delay for minimum alarm	0 - 99 minutes	0 min
34	Delay for maximum alarm	0 - 99 minutes	0 min
35	Function of alarm output	0 = watch alarm 1 = control alarm	1
36	Reset alarm when the cause of alarm is rectified	0 = No; 1 = Yes	1
37	Reset alarm when **SET** button is pressed (display only)	0 = No; 1 = Yes	1
40	Power delay after power failure	0 - 99 minutes	0 min
41	Forced relay function at humidity transmitter failure	0 = Off; 1 = Humidification; 2 = Dehumidification	2

[1] Switches on when RH rises above 2% of the setpoint, Off when the RH falls below 1 % of the setpoint
[2] Switches on when RH rises above 6% of the setpoint, Off when the RH falls below 1 % of the setpoint

Table 7-1. Operator panel system parameters

7.4.4 Process related alarms

The operator panel is equipped with an internal alarm, that is activated when the alarm limits are exceeded. The alarm is indicated in the display of the operator panel.

Reading alarm messages

The display of the operator panel indicate (steadily lit) following messages:

rHI Upper alarm limit exceeded

rLO Lower alarm limit exceeded

E1 Faulty humidity transmitter or incorrect connections

EEE All parameters settings are lost

Acknowledge alarms

Acknowledge the alarm by pressing **SET** on the operator panel. The display now starts to flash showing the alarm message and the current relative air humidity alternately. The function of the reset depends on the settings of parameters, *see table 7-1*.

Sensor calibration

The humidity transmitterís read off value can be calibrated with the Operator Panel's Sensor Offset (parameter 05, *see table 7-1*.) e.g. 3 %RH too much, the offset needs to be decreased with 3%.

For calibration of the humidity transmitter please contact Munters Product Service.

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